



Illinois Department of Transportation

To: John Fortman Attn: District One
From: John D. Baranzelli
Subject: Pavement Design
Date: December 18, 2012

A handwritten signature in black ink, appearing to be 'J.D. Baranzelli'.

Des Plaines River Road
Section 1213 & 3222 R
Cook County
From 0.4 miles north of Touhy Avenue to US 12 (Rand Road)

We have reviewed the pavement design for the above captioned section, which was submitted to BDE on October 12, 2012. Life cycle costs favor the rigid design by more than 10%. Oakton Street, Algonquin Road, US 14 (Miner/Dempster Street), Elk Boulevard and US 12 (Rand Road) are short sections of intersecting roads that will match the Des Plaines River Road pavement design. Lee Street is under the jurisdiction of the City of Des Plaines, and will match Des Plaines River Road per the city's request.

The approved pavement design is as follows:

Des Plaines River Road [Reconstruction]

Oakton Street, Algonquin Road, US 14 (Miner/Dempster Street), Elk Boulevard, US 12 (Rand Road) and Lee Road [Reconstruction]

9 inches of Jointed PCC with tied PCC Curb and Gutter
12 inches of Aggregate Subgrade Improvement

US 14 (Miner/Dempster Street), Busse Highway [Widening]

10.25 inches of Full-Depth HMA Pavement
1.75 inches HMA Polymerized Surface Course, Mix "F", N90
0.75 inches HMA Polymerized Leveling Binder Machine Method, IL-4.75, N50
7.75 inches HMA Binder Course, IL-19.0, N90
12 inches Aggregate Subgrade Improvement

US 14 (Miner/Dempster Street), Busse Highway [Resurfacing]

2.25 inches of Full-Depth HMA Pavement Removal

1.75 inches HMA Polymerized Surface Course, Mix "F", N90

0.75 inches HMA Polymerized Leveling Binder Machine Method, IL-4.75, N50

US 12 (Rand Road)[Widening]

11 inches of Full-Depth HMA Pavement

1.75 inches HMA Polymerized Surface Course, Mix "F", N90

0.75 inches HMA Polymerized Leveling Binder Machine Method, IL-4.75, N50

8.5 inches HMA Binder Course, IL-19.0, N90

12 inches Aggregate Subgrade Improvement

US 12 (Rand Road)[Resurfacing]

2.25 inches of Full-Depth HMA Pavement Removal

1.75 inches HMA Polymerized Surface Course, Mix "F", N90

0.75 inches HMA Polymerized Leveling Binder Machine Method, IL-4.75, N50

Des Plaines River Road [Temporary Pavement]

Option 1

10 inches of Full-Depth HMA Pavement

2 inches HMA Surface Course, Mix "D", N50

8 inches HMA Binder Course, IL-19.0, N50

4 inches Aggregate Subgrade Improvement

Option 2

8 inches of Temporary PCC

4 inches of Aggregate Subgrade Improvement

If you have any questions, please contact Paul Niedernhofer at (217) 524-1651.



Illinois Department of Transportation

Memorandum

To:	John D. Baranzelli	Attn:	Paul Niedernhofer
From:	John Fortmann	By:	Jose Dominguez
Subject:	Pavement Analysis*		
Date:	October 12, 2012		

*Route: Des Plaines River Road	Section: 1213 & 3222 R
Limits: 0.4 miles N. of Touhy Avenue to US-12 (Rand Road)	County: Cook
Contract No.: 62267	Job No.: D-91-285-01
Letting: 03CY13	

We have completed the pavement analysis for the above captioned location. Review by the Central Office is required since the total pavement area for reconstruction exceeds 4,750 Square Yards. Upon completing the reconstruction of Des Plaines River Road there will be a Jurisdictional Transfer for its' maintenance from the State of Illinois to the City of Des Plaines. The following is the scope of the project:

- a.) Reconstruction of Des Plaines River Road from 0.4 miles N. of Touhy Avenue to US-12 (Rand Road) for approximately 14,195 feet.
- b.) Reconstruction of Oakton Street, Algonquin Road, US-14 (Miner/Dempster Street), Elk Boulevard, and US-12 (Rand Road) at the intersections of Des Plaines River Road.
- c.) Widening and resurfacing of US-14 (Miner/Dempster Street) at Des Plaines River Road to add a single right-turn lane and of Busse Highway at US-14 for a larger turning radius.
- d.) New construction of Lee Street to end at Harding Avenue thus rerouting US-12/45 along Elk Boulevard to Des Plaines River Road.
- e.) Resurfacing of US-12 (Rand Road) from Station 915+54 to 916+00 and reconstruction from Station 916+00 to 916+67 and 922+64 to 923+00.
- f.) Temporary Pavement to partially maintain 1 lane of traffic in a single direction throughout the length of Des Plaines River Road for a total service life up to 2.5 years.

A 20 year pavement analysis was performed on the Des Plaines River Road segment. We recommend a mechanistic-rigid pavement design based on the life cycle cost analysis which favors PCC pavement by 25.7%.

a.) Des Plaines River Road

Pavement Reconstruction
Tied PCC Curb and Gutter
9" PCC Pavement Jointed ¹
12" Aggregate Subgrade Improvement ²

A segmental pavement analysis was performed at Oakton Street, Algonquin Road, US-14 (Miner/Dempster Street), Elk Boulevard, and US-12 (Rand Road). We recommend that these intersecting streets match the proposed pavement design of Des Plaines River Road due to their short lengths of reconstruction as to maintain continuity.

b.) Oakton Street, Algonquin Road, US-14 (Miner/Dempster Street), Elk Boulevard, US-12 (Rand Road)**

**Oakton Street, Algonquin Road, US-14 (Miner/Dempster Street), Elk Boulevard, and US-12 (Rand Road) are "High Stress" intersections since the design lane MU ADT exceeds 200 vehicles. District 1 recommends rigid pavement at "High Stress" intersections to be built at a minimum 150 feet back from the location of the stop bar.

Pavement Reconstruction
Tied PCC Curb and Gutter
9" PCC Pavement Jointed ¹
12" Aggregate Subgrade Improvement ²

A 20 year pavement analysis was performed on US-14 (Miner/Dempster Street) at Des Plaines River Road and on Busse Highway at US-14. We recommend a mechanistic-flexible pavement design based on a first cost analysis.

c.) US-14 (Miner/Dempster Street), Busse Highway

Pavement Widening
Tied PCC Curb and Gutter
10 ¼" Full-Depth HMA Pavement
1 ¾" HMA Polymerized Surface Course, Mix "F", N90 ^{3,7}
¾" HMA Polymerized Leveling Binder Machine Method, IL-4.75, N50 ^{4,7}
7 ¾" HMA Binder Course, IL-19.0, N90 ^{5,7}
12" Aggregate Subgrade Improvement ²

Existing Pavement Resurfacing
2 ½" HMA Pavement Surface Removal
1 ¾" HMA Polymerized Surface Course, Mix "F", N90 ^{3,7}
¾" HMA Polymerized Leveling Binder Machine Method, IL-4.75, N50 ^{4,7}

A segmental pavement analysis was performed for the new construction at Lee Street. We recommend that it match the pavement design of Des Plaines River Road per the City of Des Plaines request as well as for construction continuity.

d.) Lee Street

Pavement Reconstruction
Tied PCC Curb and Gutter
9" PCC Pavement Jointed ¹
12" Aggregate Subgrade Improvement ²

A 20 year pavement analysis was performed on the Rand Road construction limits adjacent to Des Plaines River Road. We recommend a mechanistically designed flexible pavement design to transition the existing cross-slope to the proposed rigid pavement.

e.) US-12 (Rand Road)

Existing Pavement Resurfacing from Station 915+54 to 916+00
2 ½" HMA Pavement Surface Removal
1 ¾" HMA Polymerized Surface Course, Mix "F", N90 ^{3, 7}
¾" HMA Polymerized Leveling Binder Machine Method, IL-4.75, N50 ^{4, 7}

Pavement Reconstruction from Station 916+00 to 916+67 and 922+64 to 923+00
Tied PCC Curb and Gutter
11" Full-Depth HMA Pavement
1 ¾" HMA Polymerized Surface Course, Mix "F", N90 ^{3, 7}
¾" HMA Polymerized Leveling Binder Machine Method, IL-4.75, N50 ^{4, 7}
8 ½" HMA Binder Course, IL-19.0, N90 ^{6, 7}
12" Aggregate Subgrade Improvement ²

f.) Des Plaines River Road - Temporary Pavement

Option 1) ⁸
Temporary Pavement
10" Full Depth Temporary HMA Pavement ⁹
2" HMA Surface Course, Mix "D", N50 ⁷
8" HMA Binder Course, IL-19.0, N50 ⁷
4" Aggregate Subgrade Improvement ¹⁰

Option 2) ⁸
Temporary Pavement
8" Temporary PCC Pavement ⁹
4" Aggregate Subgrade Improvement ¹⁰

We recommend that all local intersecting side streets not named in this memo follow the pavement design for Des Plaines River Road due to their short length and for construction continuity. These intersecting side streets are subject to local jurisdictional approval and concurrence.

¹ Designer Note 1: Use pay item **#42000401, "PORTLAND CEMENT CONCRETE PAVEMENT, 9" (JOINTED)"**, paid in square yards. Transverse contraction joints should be reduced to a maximum of 14 foot spacing for 9" PCC pavement.

² Designer Note 2: Use pay item **#30300112, "AGGREGATE SUBGRADE IMPROVEMENT, 12" "**, paid in square yards.

³ Designer Note 3: Use pay item **#40603595, "POLYMERIZED HOT-MIX ASPHALT SURFACE COURSE, MIX "F", N90"**, paid in tons.

⁴ Designer Note 4: Use pay item **#40600827, "POLYMERIZED LEVELING BINDER (MACHINE METHOD), IL-4.75, N50"**, paid in tons.

⁵ Designer Note 5: Use pay item **#35501315, "HOT-MIX ASPHALT BASE COURSE, 7 3/4" "**, paid for in square yards.

⁶ Designer Note 6: Use pay item **#35501318, "HOT-MIX ASPHALT BASE COURSE, 8 1/2" "**, paid for in square yards.

⁷ Designer Note 7: Refer to the District One, Bureau of Materials' "Hot-Mix Asphalt – Mix Selection" tables to determine the corresponding HMA mix table requirements for the plans.

⁸ Designer Note 8: The contractor shall have the option of constructing either material type if both Portland cement concrete and HMA are shown in the plans. For quantity estimation purposes, excavation quantities should be estimated assuming the thicker design if both options are shown in the plans.

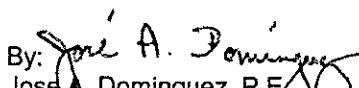
⁹ Designer Note 9: Use pay item **#Z0062456, "TEMPORARY PAVEMENT"**, paid in square yards.

According to the Special Provision for "Temporary Pavement", HMA temporary pavement shall consist of two items, an HMA binder course and an HMA surface course. Make sure to include both items in the HMA mix table requirements.

When PC Temp Pavement is used as an option, the following note shall appear on the plans adjacent to the HMA mix table: "PC Concrete temporary pavement shall consist of Class PV Concrete meeting the requirements of Art.1020 of the Standard Specifications, 8" thick. Temporary PCC pavement does not require dowel bars."

¹⁰ Designer Note 10: Use pay item **#30300104, "AGGREGATE SUBGRADE IMPROVEMENT, 4" "**, paid in square yards.

If you have any questions or need additional information, please contact Jenpai Chang, Acting Pavement Design Engineer, at (847)705-4432.

By: 
Jose A. Dominguez, P.E.
Project Support Engineer

DATE: 11/30/13
SHEET: 1

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

**PROPOSED
HIGHWAY PLANS**

F.A.U. 2710 (DES PLAINES RIVER ROAD)

SECTION: 1213 & 3222 R

DES PLAINES RIVER ROAD (FARGO AVENUE TO RAND ROAD)
PAVEMENT RECONSTRUCTION, TRAFFIC SIGNAL MODERNIZATION & LIGHTING

COOK COUNTY
C-91-285-01

FOR INDEX OF SHEETS, SEE SHEET NO. 2
FOR LIST OF STANDARDS, SEE SHEET NO. 2

DESIGN DESIGNATION:

DES PLAINES RIVER ROAD, MINOR ARTERIAL,
DESIGN SPEED: 35 M.P.H. AND 40 M.P.H.

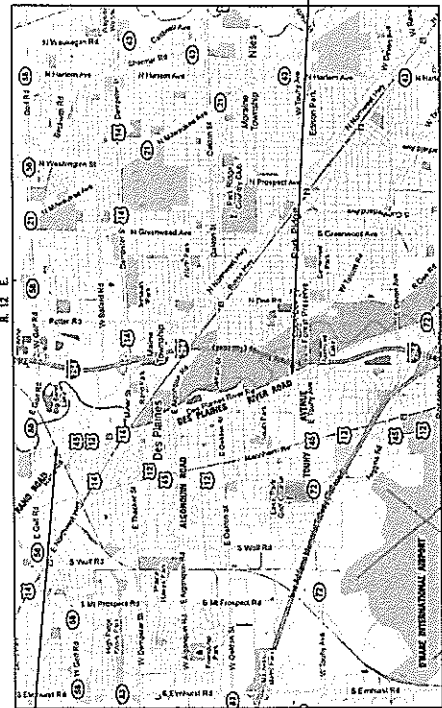
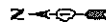
TRAFFIC DATA:

DES PLAINES RIVER ROAD: 28,020 (2010) ADT
35,000 (2030) ADT

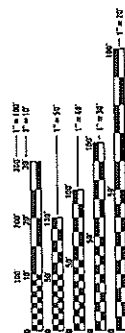
MUNICIPALITIES INVOLVED:

CITY OF DES PLAINES

END PROJECT:
STA. 281+70 DES PLAINES RIVER ROAD



BEGIN PROJECT:
STA. 119+15 DES PLAINES RIVER ROAD



FULL SIZE PLANS HAVE BEEN PREPARED USING STANDARD
ENGINEERING SCALES. REDUCED SIZE PLANS WILL NOT
CONFORM TO STANDARD SCALES. NO MACHING MEASUREMENTS
ON REDUCED PLANS. THE ABOVE SCALES MAY BE USED.

JULIE
JULIE JULY LOCATION INFORMATION FOR EXCAVATION
1-800-892-0123

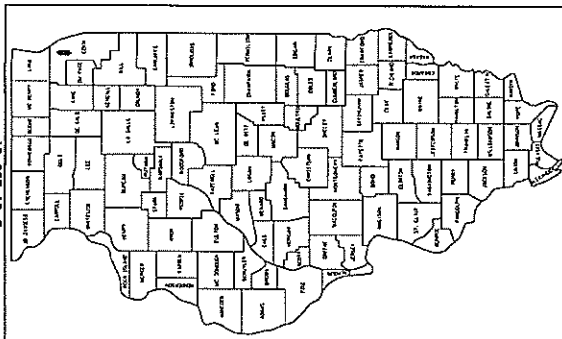
CONTRACT NO. 62267

DESCRIPTION OF WORK

THE PROJECT CONSISTS OF THE RECONSTRUCTION AND WIDENING
OF DES PLAINES RIVER ROAD FROM STA. 119+15 TO STA. 281+70
TWO LANES IN EACH DIRECTION, SEPARATED BY A FLEXIBLE MEDIAN.
WILL BE PROVIDED NEW STORM SEWERS AND RETAINING WALLS
WILL BE CONSTRUCTED AND TRAFFIC SIGNALS AND ROADWAY
LIGHTING WILL BE INSTALLED WITHIN THE PROJECT LIMITS.

GROSS LENGTH OF PROJECT = 14,255.00 FEET = 2.700 MILES
NET LENGTH OF PROJECT = 14,255.00 FEET = 2.700 MILES

D-91-285-01



LOCATION OF SECTION INDICATED HEREIN

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

SUBMITTED

20

DISTRICT ENGINEER

20

ENGINEER OF DESIGN AND ENVIRONMENT

20

DIRECTOR, DIVISION OF HIGHWAYS

PRINTED BY THE AUTHORITY
OF THE STATE OF ILLINOIS



BIRINDER S. SACHDEVA

DATE

11/30/13

DESIGNED BY:

CHRISTIAN-ROSE & ASSOCIATES, INC.
ENGINEERS-PLANNERS-SURVEYORS
1100 N. LAKE STREET, SUITE 200
CHICAGO, ILLINOIS 60610
1-312-372-2023 FAX: 1-312-372-5714

PRE FINAL

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: FAU 2710 - Des Plaines River Rd	Comments: pavement reconstruction - 20 yr design
Section: 1213 & 3222 R	
County: Cook	Design Date: 09/05/2012 AK
Location: Fargo Ave to Rand Rd	Modify Date: 09/20/2012 AK
Facility Type: Other Marked State Route	
# of Lanes = 4	
Road Class: I	
Subgrade Support Rating (SSR): Poor	
Construction Year: 2013	
Design Period (DP) = 20 years	

<-- BY	ADT	Year
Current:	28,020	2009
Future:	35,000	2030

Structural Design Traffic			
Minimum ADT	Actual ADT	Actual % of Total ADT	% of ADT in Design Lane
PV = 0	31,105	95.2%	P = 32%
SU = 250	1,046	3.2%	S = 45%
MU = 750	523	1.6%	M = 45%
Struct. Design ADT = 32,673		(2023)	

FLEXIBLE PAVEMENT

Cpv = 0.15

Csu = 132.5

Cmu = 482.53

TF flexible (Actual) = 3.55 (Actual ADT)

TF flexible (Min) = 3.56 (Min ADT Fig. 54-2.C)

RIGID PAVEMENT

Cpv = 0.15

Csu = 143.81

Cmu = 696.42

TF rigid (Actual) = 4.66 (Actual ADT)

TF rigid (Min) = 5.02 (Min ADT Fig. 54-2.C)

TRAFFIC FACTOR CALCULATION

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement		JPC Pavement	
Use TF flexible = 3.56		Use TF rigid = 5.02	
PG Grade Lower Binder Lifts = PG 64-22 (Fig. 53-4.R)		Edge Support = Tied Shoulder or C. & G.	
HMA Mixture Temp. = 74.0 deg. F (Fig. 54-5.C)		Rigid Pavt Thick. = 9.00 in. (Fig. 54-4.E)	
Design HMA Mixture Modulus (E _{HMA}) = 720 ksi (Fig. 54-5.D)			
Design HMA Strain (E _{HMA}) = 84 (Fig. 54-5.E)			
Full Depth HMA Design Thickness = 10.00 in. (Fig. 54-5.F)			
Limiting Strain Criterion Thickness = 14.50 in. (Fig. 54-5.I)			
Use Full-Depth HMA Thickness = 10.00 inches		CRCP Thickness = 8.00 in. (Fig. 54-4.M)	

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC	Unbonded Concrete Overlay
Use TF flexible = 3.56	Review 54-4.03 for limitations and special considerations.
District = 3,4,5,6	
HMA Overlay Design Thickness = 8.00 in. (Fig. 54-5.U)	JPCP Thickness = NA inches

CONTACT BMPR FOR ASSISTANCE

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

Class I Roads	Class II Roads	Class III Roads	Class IV Roads
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500	2 lanes with ADT > 2000 One way Street with ADT ≤ 3500	2 Lanes (ADT 750 - 2000)	2 Lanes (ADT < 750)

Facility Type	Min. Str. Design Traffic (Fig 54-2.C)		
	PV	SU	MU
Interstate or Supplemental Freeway	0	500	1500
Other Marked State Route	0	250	750
Unmarked State Route	No Min	No Min	No Min

Class	Traffic Factor ESAL Coefficients			
	Rigid (Fig. 54-4.C)		Flexible (Fig. 54-5.B)	
	Csu	Cmu	Csu	Cmu
I	143.81	696.42	132.50	482.53
II	135.78	567.21	112.06	385.44
III	129.58	562.47	109.14	384.35
IV	129.58	562.47	109.14	384.35

Class Table for One-Way Streets	
ADT	Class
0 - 3500	II
>3501	I

Class Table for 2 or 3 lanes (not future 4 lane & not one-way street)	
ADT	Class
0 - 749	IV
750 - 2000	III
>2000	II

Number of Lanes	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B)					
	Rural			Urban		
	P	S	M	P	S	M
1 Lane Ramp	100%	100%	100%	100%	100%	100%
2 or 3	50%	50%	50%	50%	50%	50%
4	32%	45%	45%	32%	45%	45%
6 or more	20%	40%	40%	8%	37%	37%

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION**FULL-DEPTH HMA PAVEMENT**

Standard Design

ROUTE **FAU 2710 - Des Plaines River Rd**
 SECTION **1213 & 3222 R**
 COUNTY **Cook**
 LOCATION **Fargo Ave to Rand Rd**

MAINTENANCE

FACILITY TYPE **NON-INTERSTATE**

PROJECT LENGTH **14195 FT == >** 2.69 Miles
 # OF CENTERLINES **3 CL**
 # OF LANES **4 LANES**
 # OF EDGES **3 EP**
 LANE WIDTH - AVERAGE **10.5 FT**
 SHOULDER WIDTH HMA Inside **0 FT**
 HMA Outside **0 FT**

PAVEMENT THICKNESS (FLEXIBLE) **10.00 IN** **14.50 IN MAX**
 SHOULDER THICKNESS **8.00 IN** HMA_SD Standard Design
 POLICY OVERLAY THICKNESS **2.25 IN**

FLEX PAVEMENT	TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
		3.56	3.55	3.56

Read Me!

HMA	COST PER TON	UNIT PRICE
HMA SURFACE		\$95.00 / TON
HMA TOP BINDER		\$90.00 / TON
HMA LOWER BINDER		\$85.00 / TON
HMA BINDER (LEVELING)		\$95.00 / TON
HMA SHOULDER		\$85.00 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
HMA PAVEMENT (FULL-DEPTH)	(10.00")	68,337	68,337 SQ YD *	\$50.79 / SQ YD	\$0
HMA SURFACE COURSE	(2.00")	1,0060	68,337 SQ YD *	\$14.78 / SQ YD	\$1,010,021 ~
HMA TOP BINDER COURSE	(2.25")	1,0185	68,337 SQ YD *	\$9.86 / SQ YD	\$673,803 ~
HMA LOWER BINDER COURSE	(5.75")	1,0424	68,337 SQ YD *	\$22.08 / SQ YD	\$1,508,881 ~
HMA SHOULDER	(8.00")	0	0 SQ YD	\$38.08 / SQ YD	\$0 ~
CURB & GUTTER		0	0 LIN FT	\$30.00 / LIN FT	\$0
SUBBASE GRAN MATL TY C (TONS)		224	TONS	\$25.00 / TON	\$5,600
IMPROVED SUBGRADE:	Aggregate	68,337	SQ YD *	\$10.00 / SQ YD	\$683,370
Reserved For User Supplied Item		0	SQ YD	\$0.00 / SQ YD	\$0
Reserved For User Supplied Item		0	SQ YD	\$0.00 / SQ YD	\$0
PAVEMENT REMOVAL		66,243	SQ YD	\$0.00 / SQ YD	\$0
SHOULDER REMOVAL		0	SQ YD	\$0.00 / SQ YD	\$0

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST **\$3,881,675**
 FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE **\$58,887**

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	DEPTH	UNIT COST
ROUTINE MAINTENANCE ACTIVITY				\$0.00 LANE-MILE / YEAR
HMA OVERLAY PVMT SURF	(2.00")	(HMA SURFACE MIX)	2.00	\$14.78 / SQ YD
HMA OVERLAY PVMT	(2.25")		2.25	\$16.63 / SQ YD
HMA SURFACE MIX	(1.75")	(HMA SURFACE MIX)	1.75	\$11.09 / SQ YD
HMA BINDER MIX	(0.50")	(Leveling Binder Mix)	0.50	\$5.54 / SQ YD
HMA OVERLAY SHLD (Year 30)	(2.25")	(HMA SHLD MIX)	2.25	\$16.63 / SQ YD
HMA OVERLAY SHLD	(2.00")	(HMA SHLD MIX)	2.00	\$14.78 / SQ YD
MILLING (2.00 IN)			2.00	\$2.50 / SQ YD
PARTIAL DEPTH PVMT PATCH	(Mill & Fill Surf)	(HMA SURFACE MIX)	2.00	\$90.83 / SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill Surf)	(HMA SHLD MIX)	2.00	\$89.71 / SQ YD
PARTIAL DEPTH PVMT PATCH	(Mill & Fill +2.00")	(HMA L BINDER)	2.00	\$90.83 / SQ YD
PARTIAL DEPTH SHLD PATCH	(Mill & Fill +2.00")	(HMA SHLD MIX)	2.00	\$89.71 / SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL				\$2.00 / LIN FT
CENTERLINE JOINT ROUT & SEAL				\$2.00 / LIN FT
RANDOM / THERMAL CRACK ROUT & SEAL	(100% Rehab = 110.00' / Station / Lane)			\$2.00 / LIN FT

FLEXIBLE TOTAL LIFE-CYCLE COST **\$6,095,746**
 FLEXIBLE TOTAL ANNUAL COST PER MILE **\$92,476**

PCC PAVEMENT**JPCP**

ROUTE **FAU 2710 - Des Plaines River Rd**
 SECTION **1213 & 3222 R**
 COUNTY **Cook**
 LOCATION **Fargo Ave to Rand Rd**

FACILITY TYPE **NON-INTERSTATE**

MAINTENANCE

PROJECT LENGTH **14195 FT == >** 2.69 Miles
 # OF CENTERLINES **3 CL**
 # OF LANES **4 LANES**
 # OF EDGES **3 EP**
 LANE WIDTH - AVERAGE **10.5 FT**
 SHOULDER WIDTH PCC Inside **0 FT**
 PCC Outside **10 FT**

PAVEMENT THICKNESS (RIGID) **JPCP 9.00 IN TIED SHLD**
 SHOULDER THICKNESS **10.00 IN**

POLICY OVERLAY THICKNESS **2.50 IN**

RIGID PAVEMENT	TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
		5.02	4.66	5.02
Worksheet Construction Type is	Reconstruction		The Pavement Type is	JPCP

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY UNIT	UNIT PRICE	COST
JPC PAVEMENT	(9.00")	68,337 SQ YD *	\$43.21 / SQ YD	\$2,952,842
PAVEMENT REINFORCEMENT		0 SQ YD	\$22.00 / SQ YD	\$0
STABILIZED SUBBASE	(4.00")	73,341 SQ YD	\$0.00 / SQ YD	\$0
PCC SHOULDERS	(10.00" to 10.00")	0 SQ YD *	\$40.00 / SQ YD	\$0
CURB & GUTTER		0 LIN FT	\$30.00 / LIN FT	\$0
SUBBASE GRAN MATL TY C	#DIV/0!	224 TONS *	\$25.00 / TON	\$5,600
IMPROVED SUBGRADE:	Aggregate	68,337 SQ YD *	\$10.00 / SQ YD	\$683,370
Reserved For User Supplied Item		0	\$0.00	\$0
Reserved For User Supplied Item		0	\$0.00	\$0
PAVEMENT REMOVAL		66,243 SQ YD	\$0.00 / SQ YD	\$0
SHOULDER REMOVAL		23,658 SQ YD	\$0.00 / SQ YD	\$0

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST **\$3,641,812**
 RIGID CONSTRUCTION ANNUAL COST PER MILE **\$55,248**

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL DEPTH	UNIT COST
ROUTINE MAINTENANCE ACTIVITY			\$0.00 / LANE-MILE / YEAR
HMA POLICY OVERLAY	(2.50")	2.50	
HMA POLICY OVERLAY PVMT	(2.50")	2.50	\$18.48 / SQ YD
HMA SURFACE MIX	(1.75")	HMA Surface Mix 1.75	\$11.09 / SQ YD
HMA BINDER MIX	(0.75")	Leveling Binder Mix 0.75	\$7.39 / SQ YD
HMA POLICY OVERLAY SHLD	(2.50")	2.50	\$18.48 / SQ YD
CLASS A PAVEMENT PATCHING			\$170.00 / SQ YD
CLASS B PAVEMENT PATCHING			\$130.00 / SQ YD
CLASS C SHOULDER PATCHING			\$110.00 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)	(HMA SURFACE MIX)	1.75	\$89.50 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")	(HMA SURFACE MIX)	2.50	\$93.49 / SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL			\$2.00 / LIN FT
CENTERLINE JOINT ROUT & SEAL			\$2.00 / LIN FT
REFLECTIVE TRANSVERSE CRACK ROUT & SEAL			\$2.00 / LIN FT
RANDOM CRACK ROUT & SEAL	(100% Rehab = 100.00' / Station / Lane)		\$2.00 / LIN FT

RIGID TOTAL LIFE-CYCLE COST **\$4,848,273**
 RIGID TOTAL ANNUAL COST PER MILE **\$73,551**

FULL-DEPTH HMA PAVEMENT
HMA OVERLAY OF RUBBLIZED PCC PAVEMENT
Figure 54-7.C
STANDARD DESIGN

MAINTENANCE COSTS:	ITEM	%	QUANTITY	UNIT COST	COST	PRESENT WORTH
YEAR 5						
	LONG SHLD JT R&S	LIN FT 100.00%	42,585	\$2.00	\$85,170	
	CNTR LINE JOINT R&S	LIN FT 100.00%	42,585	\$2.00	\$85,170	
	RNDM / THRM CRACK R&S	LIN FT 50.00%	31,229	\$2.00	\$62,458	
	PD PVMT PATCH M&F SURF	SQ YD 0.10%	68	\$90.83	\$6,176	
	PWFn =	0.8626	PW =	0.8626 X	\$238,974	\$206,141
YEAR 10						
	LONG SHLD JT R&S	LIN FT 100.00%	42,585	\$2.00	\$85,170	
	CNTR LINE JOINT R&S	LIN FT 100.00%	42,585	\$2.00	\$85,170	
	RNDM / THRM CRACK R&S	LIN FT 50.00%	31,229	\$2.00	\$62,458	
	PD PVMT PATCH M&F SURF	SQ YD 0.50%	342	\$90.83	\$31,064	
	PWFn =	0.7441	PW =	0.7441 X	\$263,862	\$196,338
YEAR 15						
	MILL PVMT & SHLD 2.00"	SQ YD 100.00%	68,337	\$2.50	\$170,843	
	PD PVMT PATCH M&F ADD'L 2.00"	SQ YD 1.00%	683	\$90.83	\$62,037	
	HMA OVERLAY PVMT 2.00"	SQ YD 100.00%	68,337	\$14.78	\$1,010,021	
	HMA OVERLAY SHLD 2.00"	SQ YD 100.00%	0	\$14.78	\$0	
	PWFn =	0.6419	PW =	0.6419 X	\$1,242,901	\$797,771
YEAR 20						
	LONG SHLD JT R&S	LIN FT 100.00%	42,585	\$2.00	\$85,170	
	CNTR LINE JOINT R&S	LIN FT 100.00%	42,585	\$2.00	\$85,170	
	RNDM / THRM CRACK R&S	LIN FT 50.00%	31,229	\$2.00	\$62,458	
	PD PVMT PATCH M&F SURF	SQ YD 0.10%	68	\$90.83	\$6,176	
	PWFn =	0.5537	PW =	0.5537 X	\$238,974	\$132,314
YEAR 25						
	LONG SHLD JT R&S	LIN FT 100.00%	42,585	\$2.00	\$85,170	
	CNTR LINE JOINT R&S	LIN FT 100.00%	42,585	\$2.00	\$85,170	
	RNDM / THRM CRACK R&S	LIN FT 50.00%	31,229	\$2.00	\$62,458	
	PD PVMT PATCH M&F SURF	SQ YD 0.50%	342	\$90.83	\$31,064	
	PWFn =	0.4776	PW =	0.4776 X	\$263,862	\$126,022
	HMA_SD					
YEAR 30	NON-INTERSTATE					
	MILL PVMT & SHLD 2.00"	SQ YD 100.00%	68,337	\$2.50	\$170,843	
	PD PVMT PATCH M&F ADD'L 2.00"	SQ YD 2.00%	1,367	\$90.83	\$124,165	
	PD SHLD PATCH M&F ADD'L 2.00"	SQ YD 1.00%	0	\$89.71	\$0	
	HMA OVERLAY PVMT 2.25"	SQ YD 100.00%	68,337	\$16.63	\$1,136,273	
	HMA OVERLAY SHLD 2.25"	SQ YD 100.00%	0	\$16.63	\$0	
	PWFn =	0.4120	PW =	0.4120 X	\$1,431,281	\$589,669
YEAR 35						
	LONG SHLD JT R&S	LIN FT 100.00%	42,585	\$2.00	\$85,170	
	CNTR LINE JOINT R&S	LIN FT 100.00%	42,585	\$2.00	\$85,170	
	RNDM / THRM CRACK R&S	LIN FT 50.00%	31,229	\$2.00	\$62,458	
	PD PVMT PATCH M&F SURF	SQ YD 0.10%	68	\$90.83	\$6,176	
	PWFn =	0.3554	PW =	0.3554 X	\$238,974	\$84,927
YEAR 40						
	LONG SHLD JT R&S	LIN FT 100.00%	42,585	\$2.00	\$85,170	
	CNTR LINE JOINT R&S	LIN FT 100.00%	42,585	\$2.00	\$85,170	
	RNDM / THRM CRACK R&S	LIN FT 50.00%	31,229	\$2.00	\$62,458	
	PD PVMT PATCH M&F SURF	SQ YD 0.50%	342	\$90.83	\$31,064	
	PWFn =	0.3066	PW =	0.3066 X	\$263,862	\$80,889
						\$2,214,071
	ROUTINE MAINTENANCE ACTIVITY		10.75	0.00	\$0	\$0
					MAINTENANCE LIFE-CYCLE COST	\$2,214,071
45 YEARS	CRFn =	0.040785			MAINTENANCE ANNUAL COST PER MILE	\$33,589

JOINTED PLAIN CONCRETE PAVEMENT
UNBONDED JOINTED PLAIN CONCRETE OVERLAY
Figure 54-7.A

MAINTENANCE COSTS:	ITEM	%	QUANTITY	UNIT COST	COST	PRESENT WORTH
YEAR 10						
	PAVEMENT PATCH CLASS B	SQ YD 0.10%	68	\$130.00	\$8,840	
	PWFn =	0.7441	PW =	0.7441 X	\$8,840	\$6,578
YEAR 15						
	PAVEMENT PATCH CLASS B	SQ YD 0.20%	137	\$130.00	\$17,810	
	PWFn =	0.6419	PW =	0.6419 X	\$17,810	\$11,432
YEAR 20						
	PAVEMENT PATCH CLASS B	SQ YD 2.00%	1,367	\$130.00	\$177,710	
	SHOULDER PATCH CLASS C	SQ YD 0.50%	0	\$110.00	\$0	
	LONGITUDINAL SHLD JT R&S	LIN FT 100.00%	42,585	\$2.00	\$85,170	
	CENTERLINE JT R&S	LIN FT 100.00%	42,585	\$2.00	\$85,170	
	PWFn =	0.5537	PW =	0.5537 X	\$348,050	\$192,707
YEAR 25						
	PAVEMENT PATCH CLASS B	SQ YD 3.00%	2,050	\$130.00	\$266,500	
	SHOULDER PATCH CLASS C	SQ YD 1.00%	0	\$110.00	\$0	
	PWFn =	0.4776	PW =	0.4776 X	\$266,500	\$127,282
YEAR 30	NON-INTERSTATE					
	PAVEMENT PATCH CLASS B	SQ YD 4.00%	2,733	\$130.00	\$355,290	
	SHOULDER PATCH CLASS C	SQ YD 1.50%	0	\$110.00	\$0	
	HMA POLICY OVERLAY 2.5" (PVM	SQ YD 100.00%	68,337	\$18.48	\$1,262,526	
	HMA POLICY OVERLAY 2.5" (SHLI	SQ YD 100.00%	0	\$18.48	\$0	
	PWFn =	0.4120	PW =	0.4120 X	\$1,617,816	\$666,519
YEAR 35	NON-INTERSTATE					
	LONGITUDINAL SHLD JT R&S	LIN FT 100.00%	42,585	\$2.00	\$85,170	
	CENTERLINE JT R&S	LIN FT 100.00%	42,585	\$2.00	\$85,170	
	RANDOM CRACK R&S	LIN FT 50.00%	28,390	\$2.00	\$56,780	
	REFLECTIVE TRANSVERSE CRACK	LIN FT 40.00%	15,893	\$2.00	\$31,786	
	PD PVMT PATCH M&F HMA 2.50"	SQ YD 0.10%	68	\$93.49	\$6,357	
	PWFn =	0.3554	PW =	0.3554 X	\$265,263	\$94,270
YEAR 40	NON-INTERSTATE					
	PAVEMENT PATCH CLASS B	SQ YD 0.50%	342	\$130.00	\$44,460	
	LONGITUDINAL SHLD JT R&S	LIN FT 100.00%	42,585	\$2.00	\$85,170	
	CENTERLINE JT R&S	LIN FT 100.00%	42,585	\$2.00	\$85,170	
	REFLECTIVE TRANSVERSE CRACK	LIN FT 60.00%	23,839	\$2.00	\$47,678	
	RANDOM CRACK R&S	LIN FT 50.00%	28,390	\$2.00	\$56,780	
	PD PVMT PATCH M&F HMA 2.50"	SQ YD 0.50%	342	\$93.49	\$31,974	
	PWFn =	0.3066	PW =	0.3066 X	\$351,232	\$107,673
						\$1,206,461
	ROUTINE MAINTENANCE ACTIVITY		10.75	\$0.00	\$0	\$0
45 YEARS	CRFn =	0.040785			MAINTENANCE LIFE-CYCLE COST	\$1,206,461
					MAINTENANCE ANNUAL COST PER MILE	\$18,303

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised :

2:49 PM 07/19/2012

CONSTRUCTION	INITIAL COST	PRESENT WORTH	JPCP	HMA
			\$3,641,812	\$3,881,675
MAINTENANCE	LIFE-CYCLE COST	ANNUAL COST PER MILE	\$55,248	\$58,887
TOTAL	LIFE-CYCLE COST	PRESENT WORTH	\$1,206,461	\$2,214,071
			\$18,303	\$33,589
TOTAL	LIFE-CYCLE COST	ANNUAL COST PER MILE	\$4,848,273	\$6,095,746
			\$73,551	\$92,476

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	=====>	JPCP	\$73,551	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	HMA	\$92,476	25.7%

P:\Pavement Design Stuff\D-1\Des Plaines River Road from Touhy to Rand Road\DP River Rd from Fargo to Rand_Mechanistic Pavement Design.xlsm]LifeCycleC

PROJECT AND TRAFFIC INPUTS

(Enter Data in Gray Shaded Cells)

Route: **Rand Road**Comments: **pavement reconstruction of HMA transition to Des Plaines River Rd.**Section: **1213 & 3222 R**County: **Cook**Design Date: **10/01/2012**

AK

<-- BY

Location: **at Des Plaines River Rd**

Modify Date:

<-- BY

ADT

Year

Current:

28,100

2009

Future:

32,000

2030

Facility Type: **Other Marked State Route**

of Lanes =

4

Road Class:

I

Subgrade Support Rating (SSR):

Poor

Construction Year:

2013

Design Period (DP) =

20

years

Structural Design Traffic

	Minimum ADT	Actual ADT	Actual % of Total ADT	% of ADT in Design Lane
PV =	0	28,751	93.7%	P = 32%
SU =	250	801	2.6%	S = 45%
MU =	750	1,148	3.7%	M = 45%
Struct. Design ADT =	30,700		(2023)	

TRAFFIC FACTOR CALCULATION

FLEXIBLE PAVEMENT

Cpv = 0.15
 Csu = 132.5
 Cmu = 482.53

TF flexible (Actual) = 5.97 (Actual ADT)
 TF flexible (Min) = 3.56 (Min ADT Fig. 54-2.C)

RIGID PAVEMENT

Cpv = 0.15
 Csu = 143.81
 Cmu = 696.42

TF rigid (Actual) = 8.26 (Actual ADT)
 TF rigid (Min) = 5.02 (Min ADT Fig. 54-2.C)

NEW CONSTRUCTION / RECONSTRUCTION PAVEMENT DESIGN CALCULATIONS

Full-Depth HMA Pavement

Use TF flexible = 5.97
 PG Grade Lower Binder Lifts = **PG 64-22** (Fig. 53-4.R)
 HMA Mixture Temp. = **74.0** deg. F (Fig. 54-5.C)
 Design HMA Mixture Modulus (E_{HMA}) = 720 ksi (Fig. 54-5.D)
 Design HMA Strain (ϵ_{HMA}) = 72 (Fig. 54-5.E)
 Full Depth HMA Design Thickness = 11.00 in. (Fig. 54-5.F)
 Limiting Strain Criterion Thickness = **14.50** in. (Fig. 54-5.I)

Use Full-Depth HMA Thickness = 11.00 inches

JPC Pavement

Use TF rigid = 8.26
 Edge Support = **Tied** Shoulder or C.&G.
 Rigid Pavt Thick. = **9.75** in. (Fig. 54-4.E)

CRC Pavement

Use TF rigid = 8.26
 IBR value = 3
 CRCP Thickness = **8.75** in. (Fig. 54-4.M)

TF MUST BE > 60 FOR CRCP

RECONSTRUCTION ONLY (SUPPLEMENTAL) PAVEMENT DESIGN CALCULATIONS

HMA Overlay of Rubblized PCC

Use TF flexible = 5.97
 District = **3,4,5,6**

HMA Overlay Design Thickness = 9.25 in. (Fig. 54-5.U)

Unbonded Concrete Overlay

Review 54-4.03 for limitations and special considerations.

JPCP Thickness = NA inches

CONTACT BMPR FOR ASSISTANCE

DESIGN TABLES FROM BDE MANUAL CHAPTER 54 - PAVEMENT DESIGN

Class I Roads	Class II Roads	Class III Roads	Class IV Roads
4 lanes or more Part of a future 4 lanes or more One-way Streets with ADT > 3500	2 lanes with ADT > 2000 One way Street with ADT <= 3500	2 Lanes (ADT 750 -2000)	2 Lanes (ADT < 750)

	Min. Str. Design Traffic (Fig 54-2.C)		
Facility Type	PV	SU	MU
Interstate or Supplemental Freeway	0	500	1500
Other Marked State Route	0	250	750
Unmarked State Route	No Min	No Min	No Min

Class Table for One-Way Streets	
ADT	Class
0 - 3500	II
>3501	I

	Traffic Factor ESAL Coefficients			
	Rigid (Fig. 54-4.C)		Flexible (Fig. 54-5.B)	
Class	Csu	Cmu	Csu	Cmu
I	143.81	696.42	132.50	482.53
II	135.78	567.21	112.06	385.44
III	129.58	562.47	109.14	384.35
IV	129.58	562.47	109.14	384.35

Class Table for 2 or 3 lanes (not future 4 lane & not one-way street)	
ADT	Class
0 - 749	IV
750 - 2000	III
>2000	II

	Design Lane Distribution Factors For Structural Design Traffic (Fig. 54-2.B)					
	Rural			Urban		
Number of Lanes	P	S	M	P	S	M
1 Lane Ramp	100%	100%	100%	100%	100%	100%
2 or 3	50%	50%	50%	50%	50%	50%
4	32%	45%	45%	32%	45%	45%
6 or more	20%	40%	40%	8%	37%	37%

LIFE-CYCLE COST ANALYSIS: NEW CONSTRUCTION / RECONSTRUCTION**FULL-DEPTH HMA PAVEMENT**

Standard Design

ROUTE **FAU 2710 - Des Plaines River Rd**
 SECTION **1213 & 3222 R**
 COUNTY **Cook**
 LOCATION **Fargo Ave to Rand Rd**

MAINTENANCE

FACILITY TYPE **NON-INTERSTATE**

PROJECT LENGTH **14195 FT ==> 2.69 Miles**
 # OF CENTERLINES **3 CL**
 # OF LANES **4 LANES**
 # OF EDGES **3 EP**
 LANE WIDTH - AVERAGE **10.5 FT**
 SHOULDER WIDTH HMA Inside **0 FT**
 HMA Outside **0 FT**

PAVEMENT THICKNESS (FLEXIBLE) **10.00 IN** **14.50 IN MAX**
 SHOULDER THICKNESS **8.00 IN** HMA_SD **Standard Design**
 POLICY OVERLAY THICKNESS **2.25 IN**

FLEX PAVEMENT	TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
		3.56	3.55	3.56

Read Me!

HMA	COST PER TON	UNIT PRICE
HMA SURFACE		\$95.00 / TON
HMA TOP BINDER		\$95.00 / TON
HMA LOWER BINDER		\$80.00 / TON
HMA BINDER (LEVELING)		\$85.00 / TON
HMA SHOULDER		\$72.00 / TON

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY	UNIT	UNIT PRICE	COST
HMA PAVEMENT (FULL-DEPTH)	(10.00")	68,337	68,337 SQ YD	\$49.75 / SQ YD	\$0
HMA SURFACE COURSE	(2.00")	1,0060	68,337 SQ YD	\$14.78 / SQ YD	\$1,010,021 ~
HMA TOP BINDER COURSE	(2.25")	1,0185	68,337 SQ YD	\$9.86 / SQ YD	\$673,803 ~
HMA LOWER BINDER COURSE	(5.75")	1,0424	68,337 SQ YD	\$22.08 / SQ YD	\$1,508,881 ~
HMA SHOULDER	(8.00")	0	0 SQ YD	\$32.26 / SQ YD	\$0 ~
CURB & GUTTER		0	0 LIN FT	\$30.00 / LIN FT	\$0
SUBBASE GRAN MATL TY C (TONS)		224	TONS	\$25.00 / TON	\$5,600
IMPROVED SUBGRADE: Aggregate		70,581	SQ YD	\$7.00 / SQ YD	\$494,067
Reserved For User Supplied Item		0	SQ YD	\$0.00 / SQ YD	\$0
Reserved For User Supplied Item		0	SQ YD	\$0.00 / SQ YD	\$0
PAVEMENT REMOVAL		66,243	SQ YD	\$0.00 / SQ YD	\$0
SHOULDER REMOVAL		0	SQ YD	\$0.00 / SQ YD	\$0

Note: * Denotes User Supplied Quantity

FLEXIBLE CONSTRUCTION INITIAL COST **\$3,692,372**
 FLEXIBLE CONSTRUCTION ANNUAL COST PER MILE **\$56,015**

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL	DEPTH	UNIT COST
ROUTINE MAINTENANCE ACTIVITY				\$0.00 LANE-MILE / YEAR
HMA OVERLAY PVMT SURF	(2.00")	(HMA SURFACE MIX)	2.00	\$10.64 / SQ YD
HMA OVERLAY PVMT	(2.25")		2.25	\$11.69 / SQ YD
HMA SURFACE MIX	(1.75")	(HMA SURFACE MIX)	1.75	\$9.31 / SQ YD
HMA BINDER MIX	(0.50")	(Leveling Binder Mix)	0.50	\$2.38 / SQ YD
HMA OVERLAY SHLD (Year 30)	(2.25")	(HMA SHLD MIX)	2.25	\$9.07 / SQ YD
HMA OVERLAY SHLD	(2.00")	(HMA SHLD MIX)	2.00	\$8.06 / SQ YD
MILLING (2.00 IN)			2.00	\$3.00 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill Surf)		(HMA SURFACE MIX)	2.00	\$80.64 / SQ YD
PARTIAL DEPTH SHLD PATCH (Mill & Fill Surf)		(HMA SHLD MIX)	2.00	\$78.06 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill +2.00")		(HMA L BINDER)	2.00	\$79.52 / SQ YD
PARTIAL DEPTH SHLD PATCH (Mill & Fill +2.00")		(HMA SHLD MIX)	2.00	\$78.06 / SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL				\$2.00 / LIN FT
CENTERLINE JOINT ROUT & SEAL				\$2.00 / LIN FT
RANDOM / THERMAL CRACK ROUT & SEAL (100% Rehab = 110.00' / Station / Lane)				\$2.00 / LIN FT

FLEXIBLE TOTAL LIFE-CYCLE COST **\$5,603,968**
 FLEXIBLE TOTAL ANNUAL COST PER MILE **\$85,015**

PCC PAVEMENT**JPCP**

ROUTE FAU 2710 - Des Plaines River Rd
 SECTION 1213 & 3222 R
 COUNTY Cook
 LOCATION Fargo Ave to Rand Rd

FACILITY TYPE NON-INTERSTATE

MAINTENANCE

PROJECT LENGTH 14195 FT == > 2.69 Miles
 # OF CENTERLINES 3 CL
 # OF LANES 4 LANES
 # OF EDGES 3 EP
 LANE WIDTH - AVERAGE 10.5 FT
 SHOULDER WIDTH PCC Inside 0 FT
 PCC Outside 10 FT

PAVEMENT THICKNESS (RIGID) JPCP 9.00 IN TIED SHLD
 SHOULDER THICKNESS 10.00 IN

POLICY OVERLAY THICKNESS 2.50 IN

RIGID PAVEMENT	TRAFFIC FACTORS	MINIMUM	ACTUAL	USE
		5.02	4.66	5.02
Worksheet Construction Type is	Reconstruction		The Pavement Type is	JPCP

INITIAL COSTS

ITEM	THICKNESS	100% QUANTITY UNIT	UNIT PRICE	COST
JPC PAVEMENT	(9.00")	68,337 SQ YD *	\$43.21 / SQ YD	\$2,952,842
PAVEMENT REINFORCEMENT		0 SQ YD	\$22.00 / SQ YD	\$0
STABILIZED SUBBASE	(4.00")	73,341 SQ YD	\$0.00 / SQ YD	\$0
PCC SHOULDERS	(10.00" to 10.00")	0 SQ YD *	\$40.00 / SQ YD	\$0
CURB & GUTTER		0 LIN FT	\$30.00 / LIN FT	\$0
SUBBASE GRAN MATL TY C	#DIV/0!	224 TONS *	\$25.00 / TON	\$5,600
IMPROVED SUBGRADE:	Aggregate	70,581 SQ YD *	\$7.00 / SQ YD	\$494,067
Reserved For User Supplied Item		0	\$0.00	\$0
Reserved For User Supplied Item		0	\$0.00	\$0
PAVEMENT REMOVAL		66,243 SQ YD	\$0.00 / SQ YD	\$0
SHOULDER REMOVAL		23,658 SQ YD	\$0.00 / SQ YD	\$0

Note: * Denotes User Supplied Quantity

RIGID CONSTRUCTION INITIAL COST \$3,452,509
 RIGID CONSTRUCTION ANNUAL COST PER MILE \$52,376

MAINTENANCE COSTS:

ITEM	THICKNESS	MATERIAL DEPTH	UNIT COST
ROUTINE MAINTENANCE ACTIVITY			\$0.00 / LANE-MILE / YEAR
HMA POLICY OVERLAY	(2.50")	2.50	
HMA POLICY OVERLAY PVMT	(2.50")	2.50	\$12.88 / SQ YD
HMA SURFACE MIX	(1.75")	HMA Surface Mix 1.75	\$9.31 / SQ YD
HMA BINDER MIX	(0.75")	Leveling Binder Mix 0.75	\$3.57 / SQ YD
HMA POLICY OVERLAY SHLD	(2.50")	2.50	\$10.08 / SQ YD
CLASS A PAVEMENT PATCHING			\$195.00 / SQ YD
CLASS B PAVEMENT PATCHING			\$150.00 / SQ YD
CLASS C SHOULDER PATCHING			\$145.00 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA Surf)	(HMA SURFACE MIX)	1.75	\$79.31 / SQ YD
PARTIAL DEPTH PVMT PATCH (Mill & Fill HMA 2.50")	(HMA SURFACE MIX)	2.50	\$83.30 / SQ YD
LONGITUDINAL SHOULDER JOINT ROUT & SEAL			\$2.00 / LIN FT
CENTERLINE JOINT ROUT & SEAL			\$2.00 / LIN FT
REFLECTIVE TRANSVERSE CRACK ROUT & SEAL			\$2.00 / LIN FT
RANDOM CRACK ROUT & SEAL	(100% Rehab = 100.00' / Station / Lane)		\$2.00 / LIN FT

RIGID TOTAL LIFE-CYCLE COST \$4,562,239
 RIGID TOTAL ANNUAL COST PER MILE \$69,212

FULL-DEPTH HMA PAVEMENT
HMA OVERLAY OF RUBBLIZED PCC PAVEMENT
Figure 54-7.C
STANDARD DESIGN

MAINTENANCE COSTS:		ITEM	%	QUANTITY	UNIT COST	COST	PRESENT WORTH
YEAR 5							
	LONG SHLD JT R&S	LIN FT	100.00%	42,585	\$2.00	\$85,170	
	CNTR LINE JOINT R&S	LIN FT	100.00%	42,585	\$2.00	\$85,170	
	RNDM / THRM CRACK R&S	LIN FT	50.00%	31,229	\$2.00	\$62,458	
	PD PVMT PATCH M&F SURF	SQ YD	0.10%	68	\$80.64	\$5,484	
	PWFn =	0.8626	PW =	0.8626	X	\$238,282	\$205,544
YEAR 10							
	LONG SHLD JT R&S	LIN FT	100.00%	42,585	\$2.00	\$85,170	
	CNTR LINE JOINT R&S	LIN FT	100.00%	42,585	\$2.00	\$85,170	
	RNDM / THRM CRACK R&S	LIN FT	50.00%	31,229	\$2.00	\$62,458	
	PD PVMT PATCH M&F SURF	SQ YD	0.50%	342	\$80.64	\$27,579	
	PWFn =	0.7441	PW =	0.7441	X	\$260,377	\$193,745
YEAR 15							
	MILL PVMT & SHLD 2.00"	SQ YD	100.00%	68,337	\$3.00	\$205,011	
	PD PVMT PATCH M&F ADD'L 2.00"	SQ YD	1.00%	683	\$79.52	\$54,312	
	HMA OVERLAY PVMT 2.00"	SQ YD	100.00%	68,337	\$10.64	\$727,106	
	HMA OVERLAY SHLD 2.00 "	SQ YD	100.00%	0	\$8.06	\$0	
	PWFn =	0.6419	PW =	0.6419	X	\$986,429	\$633,151
YEAR 20							
	LONG SHLD JT R&S	LIN FT	100.00%	42,585	\$2.00	\$85,170	
	CNTR LINE JOINT R&S	LIN FT	100.00%	42,585	\$2.00	\$85,170	
	RNDM / THRM CRACK R&S	LIN FT	50.00%	31,229	\$2.00	\$62,458	
	PD PVMT PATCH M&F SURF	SQ YD	0.10%	68	\$80.64	\$5,484	
	PWFn =	0.5537	PW =	0.5537	X	\$238,282	\$131,931
YEAR 25							
	LONG SHLD JT R&S	LIN FT	100.00%	42,585	\$2.00	\$85,170	
	CNTR LINE JOINT R&S	LIN FT	100.00%	42,585	\$2.00	\$85,170	
	RNDM / THRM CRACK R&S	LIN FT	50.00%	31,229	\$2.00	\$62,458	
	PD PVMT PATCH M&F SURF	SQ YD	0.50%	342	\$80.64	\$27,579	
	PWFn =	0.4776	PW =	0.4776	X	\$260,377	\$124,358
HMA_SD							
YEAR 30 NON-INTERSTATE							
	MILL PVMT & SHLD 2.00"	SQ YD	100.00%	68,337	\$3.00	\$205,011	
	PD PVMT PATCH M&F ADD'L 2.00"	SQ YD	2.00%	1,367	\$79.52	\$108,704	
	PD SHLD PATCH M&F ADD'L 2.00"	SQ YD	1.00%	0	\$78.06	\$0	
	HMA OVERLAY PVMT 2.25"	SQ YD	100.00%	68,337	\$11.69	\$798,860	
	HMA OVERLAY SHLD 2.25 "	SQ YD	100.00%	0	\$9.07	\$0	
	PWFn =	0.4120	PW =	0.4120	X	\$1,112,575	\$458,366
YEAR 35							
	LONG SHLD JT R&S	LIN FT	100.00%	42,585	\$2.00	\$85,170	
	CNTR LINE JOINT R&S	LIN FT	100.00%	42,585	\$2.00	\$85,170	
	RNDM / THRM CRACK R&S	LIN FT	50.00%	31,229	\$2.00	\$62,458	
	PD PVMT PATCH M&F SURF	SQ YD	0.10%	68	\$80.64	\$5,484	
	PWFn =	0.3554	PW =	0.3554	X	\$238,282	\$84,681
YEAR 40							
	LONG SHLD JT R&S	LIN FT	100.00%	42,585	\$2.00	\$85,170	
	CNTR LINE JOINT R&S	LIN FT	100.00%	42,585	\$2.00	\$85,170	
	RNDM / THRM CRACK R&S	LIN FT	50.00%	31,229	\$2.00	\$62,458	
	PD PVMT PATCH M&F SURF	SQ YD	0.50%	342	\$80.64	\$27,579	
	PWFn =	0.3066	PW =	0.3066	X	\$260,377	\$79,820
							\$1,911,596
ROUTINE MAINTENANCE ACTIVITY				10.75	0.00	\$0	\$0
				MAINTENANCE LIFE-CYCLE COST			\$1,911,596
45 YEARS	CRFn =	0.040785	MAINTENANCE ANNUAL COST PER MILE			\$29,000	

MAINTENANCE COSTS:		ITEM	%	QUANTITY	UNIT COST	COST	PRESENT WORTH
YEAR 10							
	PAVEMENT PATCH CLASS B	SQ YD	0.10%	68	\$150.00	\$10,200	
		PWF _n =	0.7441	PW =	0.7441 X	\$10,200	\$7,590
YEAR 15							
	PAVEMENT PATCH CLASS B	SQ YD	0.20%	137	\$150.00	\$20,550	
		PWF _n =	0.6419	PW =	0.6419 X	\$20,550	\$13,190
YEAR 20							
	PAVEMENT PATCH CLASS B	SQ YD	2.00%	1,367	\$150.00	\$205,050	
	SHOULDER PATCH CLASS C	SQ YD	0.50%	0	\$145.00	\$0	
	LONGITUDINAL SHLD JT R&S	LIN FT	100.00%	42,585	\$2.00	\$85,170	
	CENTERLINE JT R&S	LIN FT	100.00%	42,585	\$2.00	\$85,170	
		PWF _n =	0.5537	PW =	0.5537 X	\$375,390	\$207,844
YEAR 25							
	PAVEMENT PATCH CLASS B	SQ YD	3.00%	2,050	\$150.00	\$307,500	
	SHOULDER PATCH CLASS C	SQ YD	1.00%	0	\$145.00	\$0	
		PWF _n =	0.4776	PW =	0.4776 X	\$307,500	\$146,864
YEAR 30	NON-INTERSTATE						
	PAVEMENT PATCH CLASS B	SQ YD	4.00%	2,733	\$150.00	\$409,950	
	SHOULDER PATCH CLASS C	SQ YD	1.50%	0	\$145.00	\$0	
	HMA POLICY OVERLAY 2.5" (PVM	SQ YD	100.00%	68,337	\$12.88	\$880,181	
	HMA POLICY OVERLAY 2.5" (SHLI	SQ YD	100.00%	0	\$10.08	\$0	
		PWF _n =	0.4120	PW =	0.4120 X	\$1,290,131	\$531,517
YEAR 35	NON-INTERSTATE						
	LONGITUDINAL SHLD JT R&S	LIN FT	100.00%	42,585	\$2.00	\$85,170	
	CENTERLINE JT R&S	LIN FT	100.00%	42,585	\$2.00	\$85,170	
	RANDOM CRACK R&S	LIN FT	50.00%	28,390	\$2.00	\$56,780	
	REFLECTIVE TRANSVERSE CRACK	LIN FT	40.00%	15,893	\$2.00	\$31,786	
	PD PVMT PATCH M&F HMA 2.50"	SQ YD	0.10%	68	\$83.30	\$5,664	
		PWF _n =	0.3554	PW =	0.3554 X	\$264,570	\$94,024
YEAR 40	NON-INTERSTATE						
	PAVEMENT PATCH CLASS B	SQ YD	0.50%	342	\$150.00	\$51,300	
	LONGITUDINAL SHLD JT R&S	LIN FT	100.00%	42,585	\$2.00	\$85,170	
	CENTERLINE JT R&S	LIN FT	100.00%	42,585	\$2.00	\$85,170	
	REFLECTIVE TRANSVERSE CRACK	LIN FT	60.00%	23,839	\$2.00	\$47,678	
	RANDOM CRACK R&S	LIN FT	50.00%	28,390	\$2.00	\$56,780	
	PD PVMT PATCH M&F HMA 2.50"	SQ YD	0.50%	342	\$83.30	\$28,489	
		PWF _n =	0.3066	PW =	0.3066 X	\$354,587	\$108,701
							\$1,109,730
ROUTINE MAINTENANCE ACTIVITY				10.75	\$0.00	\$0	\$0
				MAINTENANCE LIFE-CYCLE COST			\$1,109,730
45 YEARS	CRF _n =	0.040785	MAINTENANCE ANNUAL COST PER MILE				\$16,835

LIFE-CYCLE COST ANALYSIS: NEW DESIGN

Calculated / Revised :

2:49 PM 07/19/2012

CONSTRUCTION	INITIAL COST	PRESENT WORTH ANNUAL COST PER MILE	JPCP	HMA
			\$3,452,509 \$52,376	\$3,692,372 \$56,015
MAINTENANCE	LIFE-CYCLE COST	PRESENT WORTH ANNUAL COST PER MILE	\$1,109,730 \$16,835	\$1,911,596 \$29,000
TOTAL	LIFE-CYCLE COST	PRESENT WORTH ANNUAL COST PER MILE	\$4,562,239 \$69,212	\$5,603,968 \$85,015

LIFE-CYCLE COST ANALYSIS: FINAL SUMMARY

LOWEST COST OPTION	=====>	JPCP	\$69,212	
OTHER OPTIONS (LOWEST TO HIGHEST):	TYPE / PERCENTAGE	HMA	\$85,015	22.8%

P:\Pavement Design Stuff\D-1\Des Plaines River Road from Touhy to Rand Road\[Rand Rd_Mechanistic Pavement Design.xlsm]LifeCycleCost